DOCUMENT RESUME

ED 323 118 SE 051 578

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TITLE Mathematics/Computer Integrated Curriculum, Grade 6.
SPONS AGENCY Texas Higher Education Coordinating Board, Austin.
PUB DATE Aug 90
NOTE 53p.; For related documents, see SE 051 573-577.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; Computer Uses in Education; *Course Content; Curriculum Design; Curriculum Development; Curriculum Guides; *Elementary School Mathematics; Fractions; Geometry; *Grade 6; *Graphs; Instructional Materials; Intermediate Grades; Learning Activities; Mathematics Curriculum; *Mathematics Education; Mathematics Skills; Teaching Guides
IDENTIFIERS *LOGO Programing Language

ABSTRACT

This manual designed for grade 6 is part of a series for a program to integrate the teaching and learning of mathematical and computer concepts and skills in the elementary school. The manual contains 34 lessons. Each lesson includes information on the topic, suggested grade level, mathematics concepts and skills, objective, prerequisite skills needed, and activities. Topics contained in the lessons include: (1) problem solving; (2) geometry; (3) numbers; (4) number concepts; (5) computer commands; (6) fractions; and (7) graphing. Software programs used for the activities are specified for each lesson. (KR)

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Mathematics / Computer Integrated Curriculum Grade 6

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SE 051 578

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This curriculum material was produced under a grant from the Texas Higher Education Coordinating Board and the U.S. Education Department under the auspices of the Eisenhower Mathematics and Science Grants Program, Title II.

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How can Integrated Computer Curriculum be used in Elementary School (and can I do it?)

by: Michelle Murray-Hurst

Upon entering the last decade of the 20th century-- we are continuing to move forward into the age of technology. Computers of some types have been around since the 1940's and have been used in the school setting since the 1960's. But, are we using the computers effectively and if so, are we integrating them into the regular curriculum? Educators seem to be aware of the need for computer instruction in the middle and upper grades but often it is thought that computers in the lower elementary grades are only for drill, practice, and games. WRONG!! These young children are very interested in computers and are capable of solving some complex problems. Many times students find that grasping concepts is easier using the computer rather than the traditional methods of instruction. Because children are unique and have different learning styles it seems important to provide as many learning opportunities as possible. The computer allows increased methods by providing visual, tactile, and some times auditory responses.

But, let's face the problem, computers are an important part of instruction at all grade levels but the most important fact is to use them on a primary level. Elementary education is the perfect place to begin a strong base of computers because of these students' hunger for knowledge. Mathematics conveniently lends itself to the integration of the computer. It can be done and is being done today. Integration may take a little extra time and effort but the rewards could be bountiful. The mathematics

curriculum is relatively simple and all of the objectives may be taught or enriched by using the computer.

Now is the time that educators realize that computers are our friends and want to make our lives easier. It is our responsibility to allow our children to grow up with computer knowledge and not be afraid to experience new technological advances.

Integration of computers into the curriculum is here today and is something that can be easily expanded through ingenuity and creativity. Many curriculum documents to assist teachers in making this transition have been developed. This document was designed for kindergarten through sixth grade and the lessons can be presented by teachers with very little computer experience. So we recognize that integration can be easily done.

Computer Lesson #__1___

Topic: Program Commands

Suggested Grade Level: 6

Mathematical Essential Element: 1

Descriptor:1.8

Objective: TLW master Logo commands used in simple programming

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Content Description:Selecting appropriate materials and methods for solutions such as concrete manipulatives, mental computation, paper and pencil, calculator, or computer.

Prerequisite Student Skills: Letter, word, and number recognition

Activities:

1. Discuss and practice the following commands:
   - ST - show turtle
   - CS - clear screen
   - RT - right turn
   - LT - left turn
   - FD - forward
   - BK - backward
   - HOME - clear screen
2. Do simple commands
   RT, FD, FD, RT, FD, FD, RT, FD, FD, RT, FD, FD
3. REPEAT - to do again a certain number of times
   REPEAT 4[RT, FD, FD, FD]

Instructional Resource:EZ LOGO, APPLE IIe

Computer Lesson #__2___

Topic: Fractions

Suggested Grade Level: 6

Mathematical Essential Element: 01, 3

Descriptor: 0105, 3.3

Objective: 010503

Content Description: Identify equivalent fractional parts using an object or set of objects . Identifying the appropriate equivalent form of a number in application problems.

Prerequisite Student Skills: construct rectangle

Activities:

1. Program command of a rectangle LT 90 FD 80 RT 90 FD 50 RT 90 FD 80 RT 90 FD 50 END
2. Divide rectangle into 2 equal parts and identify (RT 90 FD 50 BK 50 END)
3. Divide rectangle into 4 equal parts and identify LT 90 FD 80 BK 40 RT 90 FD 50 BK 50 RT 90 FD 40 LT 90 FD 50 BK 50 RT 90 FD 40 LT 90 FD 50 BK 50 RT 90 FD 40 END
4. Divide into eighths and identify BK 160 REPEAT 7[FD 20 LT 90 FD 50 BK 50 RT 90]
   FD 20 END
5. Ask for some names for one whole? (Ex. 2/2,4/4,8/8)
   Which is bigger 3/8 of a whole or 1/2 of a whole?_____

Instructional Resources: LOGO, Apple IIe,The Computing Teacher

Computer Lesson #__3___

Topic: Integers

Suggested Grade Level: 6

Mathematical Essential Element: 01, 3

Descriptor: 0108, 3.5

Objective: 010801

Content Description: Locate positive and negative integers on a number line. Developing the meaning of integers as representaitons for relevant problem situations.

Prerequisite Student Skills: Counting, order, EZ Logo Commands

Activities:

1. Make number line on a transparency
2. Using Ez Logo Commands move from zero to integer identified
3. Have students describe how they got to certain locations

Instructional Resource:EZ LOGO, transparency, APPLE IIe

Computer Lesson #__4___

Topic: Integers, Graphing

Suggested Grade Level: 6

Mathematical Essential Element: 01, 7

Descriptor: 0108, 7.9

Objective: 010801

Content Description:

Name coordinate of given point. Plotting on a whole coordinate plane, points that represent ordered pairs of whole numbers, simple fractions, or decimal numbers arising from application problems.

Prerequisite Student Skills: Ordered pairs, EZ Logo Commands

Activities:

1. Make transparency of coordinate plane
2. Have students use EZ Logo to locate coordinates on paper

Instructional Resource:EZ LOGO, transparency, coordinate plane, APPLE IIe

Computer Lesson #__5___

Topic: Pi

Suggested Grade Level: 6

Mathematical Essential Element: 04, 5

Descriptor: 0403, 5.3

Objective: 040302

Content Description: Pi. Developing and applying area formulas to common polygons and to circles.

Prerequisite Student Skills: measure, divide, use of calculator

Activities:

A 1. You will need some large circle shapes of many sizes (cup, frisbee, pizza pan)

2. trace shapes on a sheet of paper

3. use string to measure the distance around the circle(circumference)

4. use a ruler to find greatest width of the circle(diameter)

5. use a calculator. divide circumference by diameter

6. construct a chart

circle	circumference -c	diameter -d	c/d
#1			
#2			
#3			

7. Do you see a pattern?

B. 1. follow through these 6 steps with the turtle on the screen

a. command the turtle to walk around a SEMICIRCLE and stop

b. the turtle can tell you the diameter...d

c. you can calculate the circumference...c

Computer Lesson #__6___

Topic: Classify Angles

Suggested Grade Level: 6

Mathematical Essential Element: 05, 6

Descriptor: 0501, 6.5

Objective: 050101

Content Description: The student will be provided opportunities to use the properties of 2 dimensional figures(angles-right,acute,obtuse,straight). Classifying angles and pairs of lines, including skew lines.

Prerequisite Student Skills: What an angle is, definition of degree, Logo commands

Activities:

1. right angle-90

```
HOME
CS
FD 30
BK 30
RT 90
FD 30
```

2. acute angle-<90

```
HOME
CS
FD 50
BK 50
RT 30
FD 50
```

3. OBTUSE ANGLE->90

```
HOME
CS
FD 40
BK 40
RT 150
FD 40
```

4. STRAIGHT ANGLE-180

```
HOME
CS
FD 50
BK 50
RT 180
FD 50
```

Instructional Resource: LOGO, Apple IIe

d. tell the turtle to print out the value of...c/d

e. write down the information in a chart

f. repeat the above steps for many circles

2. copy a chart

command	circumference C	diameter D	C/D

3. for each line of commands below

a. type in command

b. predict what should happen

c. then tell the turtle to "DO IT" by pressing <return>

d. fill in your chart with the turtle's information

Command

REPEAT 360[FD 1 RT1]

REPEAT 180 [FD 1 RT 1]

PRINT XCOR

PRINT 360/114.587

REPEAT 180[FD 1 RT 2]

REPEAT 90[FD 1 RT 2]

PRINT XCOR

PRINT 180/?

REPEAT 720[FD .5 RT .5]

REPEAT 360[FD .5 RT .5]

PRINT XCOR

PRINT 720/?

4. Do you notice a pattern?

rule: no matter what the size of the circle C/D=Pi

Instructional Resource: Learning Math With Logo(p. 9-8,9-9), logo software, APPLE IIe

Computer Lesson #__7___

Topic: REGULAR POLYGONS

Suggested Grade Level: 6

Mathematical Essential Element: 05, 6

Descriptor: 0501, 6.6

Objective: 050101

Content Description: TLW identify a hexagon and an octagon as regular. Classify polygons by sides and angles.

Prerequisite Student Skills: Hexagon, Octagon, Regular, Angular Measure

Activities:

1. Write a program which commands the turtle to make 6 equal turns followed by 6 equal forward moves Ex. RT 60 FD 60 or REPEAT 6[RT 60 FD 60]
2. Write a program to construct a regular octagon
3. Let explore other possible regular polygons(square, pentagon, etc.)

Instructional Resource: LOGO, Apple IIe

Computer Lesson #__8___

Topic: CONGRUENT ANGLES

Suggested Grade Level: 6

Mathematical Essential Element: 05, 6

Descriptor: 0502, 6.1

Objective: 050201

Content Description: Identify and distinguish between similar, congruent, and symmetrical figures.

Prerequisite Student Skills: What congruent means, what an angle is, turns, types of angles- acute, right, obtuse

Activities:

1. Identify a series of angles as acute, right, or obtuse(teacher made sheet)
2. Command screen turtle to form angles
3. Sketch designs which result from commands below
4. Match the designs with commands

COMMANDS

A)LT 90 FD 50 RT 90 FD 50

B)FD 50 RT 150 FD 50

C)RT 90 FD 50 LT 30 FD 50

D)RT 45 FD 50 RT 90 FD 50

E)LT 60 FD 50 LT 50 FD 50

F)RT 90 FD 50 RT 80 FD 50

Instructional Resource: LOGO SOFTWARE, Apple IIe, Learning Math With Logo

Computer Lesson#_9___

Topic: Rotation

Suggested Grade Level: 6

Mathematical Essential Element: 05, 6

Descriptor: 0503, 6.2

Objective: 050303

Content Description: Reproduce a rotation image of a given image. Visualizing and sketching the results of a rotation.

Prerequisite Student Skills: How to construct polygon, what rotation is, robot, turn, IT, point of turning, amount of turn, and direction of turn

Activities:

1. On graph paper fit an IT cutout on the object IT, use a robot turner to turn IT 90, and tape down an image IT
2. On your computer screen tape an object IT cutout at home(just like on graph paper), use your robot turner to predict about where the image IT should be, and tape down image IT
3. Key in the command

   IT<return> the object is drawn

   REPEAT 90[RT 1] <return> the turtle turns

   IT<return> the image is drawn
4. Discuss characteristics of objects during turn

Instructional Resource: Learning Math With Logo pp. 8-19 to 8-24, Apple IIe

Computer Lesson #__10___

Topic: TRIANGLES

Suggested Grade Level: 6

Mathematical Essential Element: 05, 6

Descriptor: 0501, 6.6

Objective: 050102

Content Description: Identify a triangle as isosceles, scalene, or equilateral. Classifying polygons by sides and angles.

Prerequisite Student Skills: Characteristics of a triangle, scalene, isosceles, or equilateral

Activities:

Teacher will instruct students to write a series of programs which command the turtle to construct one of each type of triangle.

1. Name the figure
2. Draw conclusions about the figure

COMMANDS

SCALENE -HOME CS RT 40 FD 50 RT 60 FD 75 RT 80 FD 60

EQUILATERAL - HOME CS REPEAT 3[FD 50 RT 120]

ISOSCELES - HOME CS RT 45 FD 100 RT 90 FD 100 RT 135 FD 141

Instructional Resource: LOGO software, Apple IIe, Learning Math With Logo p. 1-28

Computer Lesson #11

Topic: POLYGONS (4-SIDED)

Suggested Grade Level: 6-10 INFORMAL GEOMETRY

Mathematical Essential Element: 05, 6

Descriptor: 0501, 6.6

Objective: 050101

Content Description: From a set of four-sided polygons, identify each one by name and given their distinguishing characteristics. Classifying polygons by sides and angles.

Prerequisite Student Skills: straight line, angles, polygon, basic logo commands and repeat

Activities:

draw and name the four-sided polygon

1. SQUARE - HOME CS REPEAT 4[FD 50 RT 90]
2. RECTANGLE - HOME CS REPEAT 2[FD 20 RT 90 FD 50 RT 90]
3. PARALLELOGRAM - HOME CS REPEAT 2[RT 20 FD 40 RT 70 FD 60 RT 200 FD 40 LT 110 FD 60]

HOME CS

Instructional Resource: Terrapin LOGO, Learning Math With Logo p.1-26,1-28,7-12

Computer Lesson #__12___

Topic: ANGLES

Suggested Grade Level: 6

Mathematical Essential Element: 6 GEOMETRY

Descriptor: 6.4

Objective: TLW Construct angles and bisectors

Content Description: constructing angles and angle bisectors using a straight edge and compass

Prerequisite Student Skills: To use protractor, angles, degrees

Activities:

1. Press N for new shape
2. Press 3 for angle then return
3. Type in 90 for # of degrees then return
4. Press M for Measure
5. Press 4 for angle
6. Type in name of angle, press return, record response in data column, press return
7. Press escape for main menu, press 1 for draw
8. Press ABC to bisect angle

   Trace ABC on transparency and bisect angle

   Measure the two new angles formed using protractor

   What did you discover about angle bisectors?

Independent Practice: measure given angles on worksheet using protractor

---

Instructional Resource: The Geometric preSupposer, Apple IIe

Computer Lesson #__13___

Topic: ANGULAR MEASURE OF TRIANGLES

Suggested Grade Level: 6

Mathematical Essential Element: 5 (03 & 05)

Descriptor: 5.9 (0301 & 0501)

Objective: TLW measure and compare angles(030401 & 050102)

Content Description: Measurement - concepts and skills using metric and customary units. Measuring and comparing angles.

Prerequisite Student Skills: definition of triangles, definition of angles, addition of decimals, column addition

Activities:

1. Demonstrate sum of scalene triangle is 180
2. Insert Geometric preSupposer into Apple IIe (open apple, control, reset)
3. Press N for new shape
4. Choose shape (4 triangle)
5. Choose equilateral(5)
6. Press M to measure , press 4 to measure angles
7. Type in all 3 angles
8. Write down measures given in data column(remember to type angles with vertex in center)
9. Add measures of 3 angles, record answer on sheet, repeat this procedure using right, acute, obtuse, and isosceles by pressing escape

What did you discover about all triangles?

Instructional Resource: Apple IIe, The Geometric preSupposer

Computer Lesson #__14___

Topic: REFLECTION

Suggested Grade Level: 6

Mathematical Essential Element: 05, 6

Descriptor: 0503, 6.2

Objective: 050302

Content Description: Recognize and/or reproduce a reflection image of a given figure. Visualizing and sketching the results of a rotation, translation, or reflection using computer graphics where appropriate.

Prerequisite Student Skills: Definition of reflection, basic logo commands, REPEAT

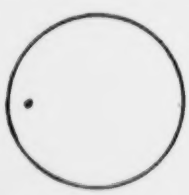
Activities:

With terrapin logo type:

REPEAT 12[FD 25 RT 15]

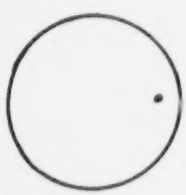
A. Instruct students to draw figure on paper with a vertical line at the right. Ex.

Given



a.

Reflection



b.

Instruct student to place a point on the circle on paper. Now instruct students to move cursor and draw a reflection of the given circle. Have students draw their circle on paper and place the point correctly.

Type HOME CS

Instructional Resource: Apple IIe, Terrapin LOGO

Computer Lesson #_15____

Topic: ANGLES ASSOCIATED WITH PARALLEL LINES AND TRANSVERSAL

Suggested Grade Level: 6

Mathematical Essential Element: 6

Descriptor: 6.4

Objective:TLW construct angles

Content Description: Define corresponding angles, vertical angles, supplementary angles, alternate interior and exterior angles as related to parallel lines.

Prerequisite Student Skills: Definitions degree and angle, parallel, EZ Logo or Basic graphics.

Activities: Draw supplementary angles. Two angles which add up to 180 degrees. HOME FD 50 BK 50 RT 30 FD 50 BK 50 RT 150 FD 50

Draw complementary angles. Two angles which add up to 90 degrees.

HOME CS FD 50 BK 50 RT 40 FD 50 BK 50 RT 50 FD 60

Draw two parallel lines with a transversal.

HOME CS FD 100 PU BK 100 RT 90 FD 50 LT 90 PD FD 100 PU BK 70 RT 90 FD 30 LT 135 PD FD 90

Instructional Resource: Apple IIe, Basic

Computer Lesson #16_____

Topic: PLOTTING ON A COORDINATE PLANE

Suggested Grade Level: 6

Mathematical Essential Element: 7

Descriptor: 7.9

Objective:

Content Description: Plotting on a whole coordinate plane points that represent ordered pairs of whole numbers, simple fractions, or decimal numbers arising from application problems.

Prerequisite Student Skills: To plot on a coordinate plane

Activities:

1. Press N for new shape
2. Press 1 for point. press RETURN point will be labeled
3. Press G for grid
4. Press A for point of origin
5. Press 2 for label
6. Press 4 for movable point(change steps to large or small)
7. Using arrows, place movable point at (3,3).Press RETURN
8. Using steps 6 & 7, plot (-3,3),(-3,-3),(3,-3)
9. Press ESC
10. Press 1 to draw. Press 1 for segment
11. List segment name. Press ESC. Segment will be drawn.

Continue steps 10 and 11 until all segments are connected.

12. What is the figure?

Instructional Resource: APPLE IIe, The Geometric preSupposer

Computer Lesson #_17____

Topic: GRAPHICS RELATIONS OF ORDERED PAIRS USING A COMPUTER WHERE APPROPRIATE

Suggested Grade Level: 6

Mathematical Essential Element: 2

Descriptor: 2.5

Objective: TLW graph relations of ordered pairs.

Content Description:

Prerequisite Student Skills: Ordered pairs, Tic Tac Toe

Activities:

1. Load bumble games
2. Press 5 to load , tic tac toe
3. Press y for instructions
4. Press RETURN
5. Enter name of player one. Press RETURN.enter name of player 2. Press RETURN
6. Play game

Instructional Resource: Bumble Games, Tic Tac Toe, Apple IIe

Computer Lesson #_18____

Topic: PROBLEM SOLVING USING ORDERED PAIRS

Suggested Grade Level: 6

Mathematical Essential Element: 1

Descriptor: 1.4

Objective: TLW communicate an understanding of a problem by describing the problem and recording the relevant information.

Content Description:

Prerequisite Student Skills: Basic math computation, ordered pairs

Activities: Use discovery sheets p.23,24,25 to enhance student math skills. Using basic problem skills, compute answers and then plot the new coordinates on the plane. Look for a pattern.

Instructional Resource: Bumble Dots Worksheets p.23,24,25

Discoveries I

Use the rule to complete each table of numbers.
Plot the number pairs and connect the points for each table.

1. y is always 1, no matter what x is.

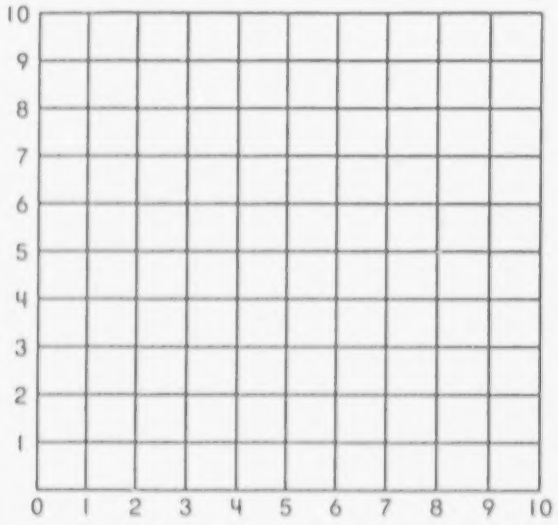
$y = 1$

x	y
2	
3	
4	
5	
6	

2. x is always 2, no matter what y is.

$x = 2$

x	y
	1
	2
	3
	4
	5
	6
	7



Discoveries II

1. y is always 9, no matter what x is.

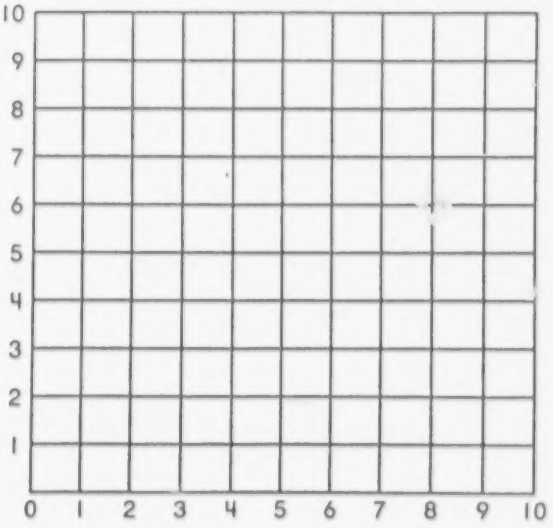
$y = 9$

x	y
2	
3	
4	
5	
6	
7	
8	

2. x is always 5, no matter what y is.

$x = 5$

x	y
	2
	3
	4
	5
	6
	7
	8
	9



Discoveries III

Use the rule to complete each table of numbers.

1. y and x are equal.

$y = x$

x	y
0	
1	
2	
3	
4	

2. y is 2 less than x.

$y = x - 2$

x	y
2	
3	
4	

3. y is always 0.

$y = 0$

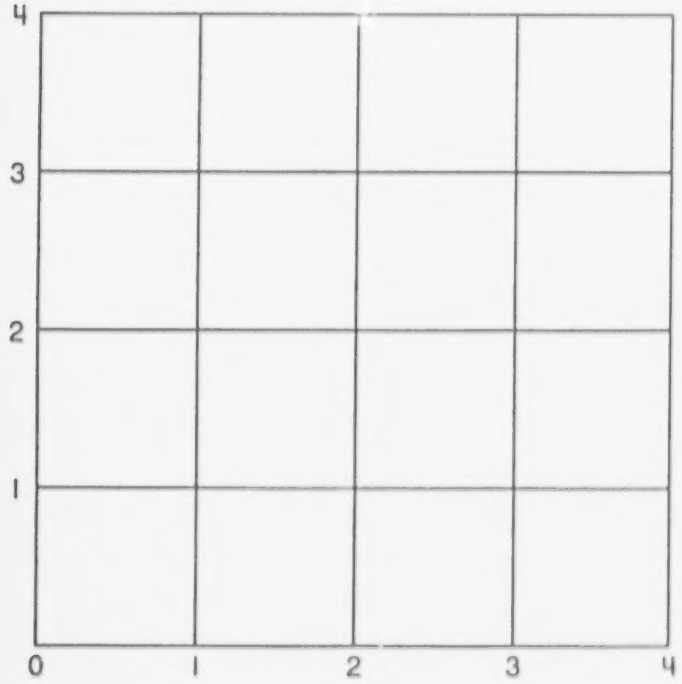
x	y
0	
1	
2	

4. x is always 4.

$x = 4$

x	y
	2
	3
	4

Plot the number pairs and connect the points for each table of numbers that you completed above.



The lines make the shape of a _____.

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Discoveries IV

Use the rule to complete each table of numbers.

1. y is twice x.

$y = 2x$

x	y
0	
1	
2	
3	
4	
5	

2. Multiply x by 2. Then subtract the answer from 20.

$y = 20 - 2x$

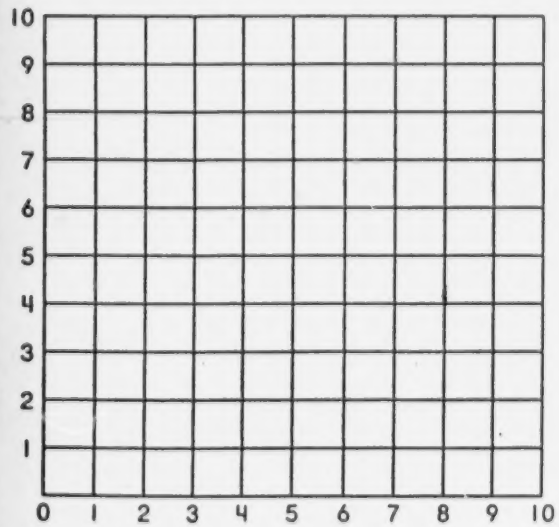
x	y
5	
6	
7	
8	
9	
10	

3. Whatever x is, y is always 4.

$y = 4$

x	y
2	
3	
4	
5	
6	
7	
8	

4. Plot the points from each table and connect them.



Computer Lesson #__19___

Topic: Quadrilaterals

Suggested Grade Level: 6

Mathematical Essential Element: 6

Descriptor: 6.6

Objective: TLW construct quadrilaterals.

Content Description: TLW be provided opportunities to use the properties of 2-dimensional figures.

Prerequisite Student Skills: Directions, LOGO commands, characterisitics of quadrilaterals, and angles of quadrilaterals.

Activities:

1. Draw a square.

```
Home
CS
RT 90
FD 50
RT 90
FD 50
RT 90
FD 50
RT 90
FD 50
or
REPEAT 4[RT 90 FD 50]
```

2. Draw a rectangle.

```
Home
CS
```

RT 90

FD 90

RT 90

FD 30

RT 90

FD 90

RT 90

FD 30

or

REPEAT 2[RT 90 FD 90 RT 90 FD 30]

3. Draw a parallelogram.

Home

CS

FD 40

RT 70

FD 100

RT 110

FD 40

RT 70

FD 100

RT 110

or

REPEAT 2[FD 40 RT 70 FD 100 RT 110]

4. Draw a trapezoid.

Home

CS

FD 100

RT 120

FD 50

RT 60

FD 45

RT 60

Home

5. Repeats offer quicker products. Allow students to create their own size quadrilaterals.

Instructional Resource: LOGO, LEARNING MATH WITH LOGO, Apple IIe

Computer Lesson#_20____

Topic: Interior and Exterior Angles

Suggested Grade Level: 6

Mathematical Essential Element: 6

Descriptor: 6.5

Objective: TLW classify angles and pairs of lines including skew lines.

Content Description: Identify the terms interior and exterior as related to specific polygons.

Prerequisite Student Skills: Supplementary angles, Basic LOGO.

Activities:

1. Draw polygons using LOGO.
2. Draw an illustration of interior and exterior angles.
3. Home

```
CS
FD 70
BK 20
RT 120
FD 70
BK 20
RT 120
FD 70
BK 20
```

Instructional Resource: LOGO, LEARNING MATH WITH LOGO, Apple IIe

Computer Lesson #__21___

Topic: Number and Numeration Concepts/Factoring Whole Numbers

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Suggested Grade Level: 6

Mathematical Essential Element: 3

Descriptor: 3.7

Objective: To find the factors of a whole number.

Content Description: Using prime factorization to investigate common factors and common multiples.

Prerequisite Student Skills: Multiplication facts, factors.

Activities:

1. Type in program:

```
 1 LIST
 5 PRINT "THIS PROGRAM WILL GIVE THE FACTORS OF THE NUMBER
YOU CHOOSE."
 9 PRINT : PRINT
10 PRINT "WHAT IS YOUR WHOLE NUMBER ":
20 INPUT W
30 PRINT "FACTOR OF ":W:" ARE :"
40 FOR F = 1 TO W
50 LET Q = W / F
60 IF Q < > INT (Q) THEN 80
70 PRINT F:" AND ":Q
80 NEXT F
90 END
RUN
```

Instructional Resource: Apple IIe, BASIC

Computer Lesson #_22____

Topic: Averaging

Suggested Grade Level: 6

Mathematical Essential Element: 7

Descriptor: 7.5

Objective: TLW use averaging.

Content Description: Use averaging in problem-solving situations. Collecting , organizing, and interpreting data to solve application problems.

Prerequisite Student Skills: Know formula for averaging.

Activities:

1. 10 LET A = 25
   20 LET B = 35
   30 LET C = 45
   40 LET AV = (A + B + C) / 3
   50 PRINT AV
   60 RUN
2. 10 LET A = 100
   20 LET B = 75
   30 LET C = 80
   40 LET D = 0
   50 LET E = 90
   60 LET AV = (A + B + C + D + E)/5
   70 PRINT AV
   RUN
3. To continue: Ask your teacher for your grades in 2 subject areas. Write your own program to get your averages.

Instructional Resource: Apple IIe, BASIC

Computer Lesson #__23___

Topic: Greatest Common Factor

Suggested Grade Level: 6

Mathematical Essential Element: 3

Descriptor: 3.6

Objective: To determine the GCF of a number less than 100.

Content Description: Writing the prime factorization for a number using exponents.

Prerequisite Student Skills: Multiplication facts, factors.

Activities:

```
100    REM      *********************************
110 REM  **** GREATEST COMMON DIVISOR ****
120    REM      *********************************
130 REM  **** A - FIRST NUMBER ****
140 REM  **** B - OTHER NUMBER ****
150 REM  **** Q - COMPUTATIONAL VARIABLE ****
160 REM  **** R - COMPUTATIONAL VARIABLE ****
165 PRINT " ENTER TWO NUMBERS FOR WHICH YOU WANT TO FIND
THE GREATEST COMMON FACTOR"
169 PRINT : PRINT
170 PRINT "ENTER FIRST NUMBER"
175 INPUT A
176 PRINT : PRINT
180 PRINT "ENTER THE SECOND NUMBER"
185 INPUT B
186 PRINT : PRINT
190 PRINT "THE GCF OF  ";A;" AND  ";B;" IS ";
200 LET Q = INT (A / B)
```

```
210 LET R = A - Q * B
220 LET A = B
230 LET B = R
240 IF R > 0 THEN 200
250 REM  ***  PRINT THE GCF OF THE TWO NUMBERS***
260 PRINT A
270 END
RUN
```

Instructional Resource: Apple IIe, BASIC

Computer Lesson #_24____

Topic: Least Common Multiple

Suggested Grade Level: 6

Mathematical Essential Element: 3

Descriptor: 3.7

Objective: To determine LCM of a number less than 100.

Content Description: Using prime factorization to investigate common factors and common multiples.

Prerequisite Student Skills: Prime numbers, multiples, factors.

Activities:

```
10 PRINT "TO FIND THEIR LEAST COMMON MULTIPLE"
20 PRINT "TYPE IN YOUR TWO NUMBERS"
30 INPUT "WHAT IS YOUR FIRST NUMBER ";D1
40 INPUT "WHAT IS YOUR SECOND NUMBER ";D2
45 FOR M = 1 TO D1
50 LET Q = (D2 * M) / D)
60 IF Q = INT (Q) THEN 80
70 NEXT M
80 PRINT "THE LEAST COMMON MULTIPLE OF ";D1;" AND ";D2;"
IS ";D2 * M
RUN
```

Instructional Resource: Apple IIe, BASIC

Computer Lesson #_25____

Topic: Prime Factors

Suggested Grade Level: 6

Mathematical Essential Element: 3

Descriptor: 3.6

Objective: To find the prime factors of a given number.

Content Description: Writing the prime factorization for a number using exponents.

Prerequisite Student Skills: Prime numbers, factors, divisibility rules, composite numbers.

Activities:

```
100   REM      **********************
110 REM  **** PRIME FACTORS ****
120   REM      **********************
130 REM  **** B - COUNTER  ****
140 REM  **** A - INTEGER ****
150 REM  **** N - INTEGER  ****
160 REM  **** I - FACTORS OF INTEGER ****
170 PRINT "PRIME FACTORS OF ANY INTEGER"
180 PRINT
190 PRINT
200 PRINT
210 PRINT "NUMBER TO BE FACTORED IS ";
220 INPUT A
230 IF ABS (A) < = 1 THEN 400
240 LET N = INT ( ABS (A) )
250 REM  **** FIND AND PRINT PRIMES ****
260 LET B = 0
```

```
270 FOR I = 2 TO N / 2
280 IF N / I > INT (N / I) THEN 360
290 LET B = B + 1
300 IF B > 1 THEN 320
310 PRINT "PRIME FACTORS OF ";N;" ARE "
320  PRINT I
330 LET N = N / I
340 IF N = 1 THEN 180
350 LET I = I  - 1
360 NEXT I
370 IF N < > INT (A) THEN 180
380 PRINT N;" IS A PRIME NUMBER"
390 GOTO 190
400 END
RUN
```

Instructional Resource: Apple IIe, BASIC

Computer Lesson #_26

Topic: PRIME AND COMPOSITE NUMBERS

Suggested Grade Level: 6

Mathematical Essential Element: 3

Descriptor:

Objective: TO DETERMINE IF A WHOLE NUMBER IS PRIME, COMPOSITE, OR NEITHER.

Content Description:

Prerequisite Student Skills: PRIME, COMPOSITE, AND WHOLE NUMBERS

Activities:

```
 10 HOME
20 PRINT "THIS PROGRAM WILL TELL IF A NUMBER"
30 PRINT "ENTERED IS PRIME, COMPOSITE, OR "
40 PRINT "NEITHER"
50 PRINT : PRINT : PRINT
60 INPUT N
70 IF N = 1 THEN 170
80 IF N = 2 THEN 130
85 IF N = 30 THEN 130
90 IF N / 2 = INT (N / 2) THEN 150
100 FOR D = 3 TO SQR (N) STEP 2
110 IF N / D = INT ( N / D ) THEN 150
120 NEXT D
130 PRINT N;" IS PRIME."
140 GOTO 50
150 PRINT N:" IS COMPOSITE."
160 GOTO 50
```

```
170 PRINT N;" IS NEITHER PRIME OR COMPOSITE."
180 GOTO 50
190 END
RUN
```

Computer Lesson #_27____

Topic: REFLECTION OF A 45 DEGREE ANGLE/ ROTATION/ SYMMETRY

Suggested Grade Level: 6

Mathematical Essential Element: 6

Descriptor: 6.1 AND 6.2

Objective:

Content Description: VISUALIZING AND SKETCHING THE RESULTS OF A ROTATION, TRANSLATION OR REFLECTION USING COMPUTER GRAPHICS WHERE APPROPRIATE.

Prerequisite Student Skills: DEFINTION OF ANGLES, REFLECTION, ROTATION, AND SYMMETRY.

Activities:

1. PRESS N FOR NEW SHAPE.
2. PRESS 3 FOR ANGLE.
3. THE NUMBER OF DEGREES IS 45.
4. PRESS 2 TO LABEL.
5. PRESS 3 FOR REFLECTION.
6. LABEL REFLECTION OF : AB REFLECTED IN : BC.
7. FOLLOW PROCESS IN STEPS 5 AND 6 USING EVERY SEGMENT OVER NEW SEGMENT.

EXTENSION:

1. HOW MANY 45 DEGREE ANGLES MAKE A CIRCLE?
2. TRACE CONSTRUCTION AND CREATE A UNIQUE DESIGN.
3. MAKE A POLYGON OF THE CONSTRUCTION.
4. NAME THE POLYGON.
5. IS THIS A ROTATION?
6. DRAW THE POSSIBLE LINES OF SYMMETRY.

Instructional Resource: APPLE IIe, GEOMETRIC PRE-SUPPOSER

Computer Lesson #28

Topic: AREA

Suggested Grade Level: 6

Mathematical Essential Element: 5

Descriptor: 5.5

Objective: TLW EXPLORE THE EFFECT ON AREA WHEN A DIMENSION OF A TWO-DIMENSIONAL FIGURE IS CHANGED.

Content Description:

Prerequisite Student Skills: POLYGONS, TERMONOLGY OF THE GEOMETRIC PRE-SUPPOSER

Activities:

1. PRESS N FOR NEW SHAPE.
2. PRESS 4 FOR TRIANGLE.
3. PRESS 1 FOR RIGHT.
4. PRESS M FOR MEASURE.
5. PRESS 3 FOR AREA.
6. AREA OF : ABC. PRESS RETURN.
7. PRESS RETURN
8. OBSERVE RESPONSE IN DATA COLUMN
9. S FOR SCALE CHANGE
10. M FOR MEASURE
11. PRESS 3 FOR AREA.
12. AREA OF : ABC. PRESS RETURN.
13. PRESS RETURN.

14. OBSERVE RESPONSE IN DATA COLUMN.

15. WHAT HAPPENED TO THE TRIANGLES?

16. WHAT HAPPENED TO THE AREA WHEN THE TRIANGLES WERE CHANGED?

17. WHAT TYPE OF CONCLUSION CAN BE DRAWN FROM THIS ACTIVITY?

EXTENSION:

1. DOES THE SAME PRINCIPLE APPLY TO QUADRILATERALS OR OTHER POLYGONS? USE THE GEOMETRIC PRE-SUPPOSER TO FIND OUT.

Instructional Resource: APPLE IIe, GEOMETRIC PRE-SUPPOSER

Computer Lesson #_29____

Topic: THREE DIMENSIONAL SHAPES- HEXAGONAL PYRAMID

Suggested Grade Level:6

Mathematical Essential Element: 6

Descriptor: 6.3

Objective:

Content Description: BUILDING MODELS OF THREE- DIMENSIONAL FIGURES SUCH AS PYRAMIDS, CONES, PRISMS WITH POLYGONAL BASES AND INVESTIGATING THE PROPERTIES ASSOCIATED WITH THOSE FIGURES.

Prerequisite Student Skills: DEFINITION OF POLYGON, APEX AND VERTICES.

Activities:

1. PRESS N FOR NEW SHAPE.
2. PRESS 6 FOR POLYGON.
3. THE NUMBER OF SIDES IS 6.
4. IT IS DEFINED BY SIDE 1.
5. THE SIDE LENGTH IS 3.
6. PRESS 2 TO LABEL.
7. PRESS FOR MOVABLE POINT.
8. USE ARROW KEYS TO SET APEX.
9. PRESS ESC.
10. PRESS 1 FOR DRAW.
11. PRESS 1 FOR SEGMENT AND NAME SEGMENT. PRESS RETURN AND DO THIS TO CONNECT ALL VERTICES TO APEX.

EXTENSION:

1. WHAT IS THE NUMBER OF FACES? WHAT IS THE NUMBER OF

VERTICES? WHAT IS THE NUMBER OF EDGES?

2. WHAT ARE THE TWO BASIC GEOMETRIC SHAPES IN THIS HEXAGONAL PYRAMID?

ENRICHMENT:

1. CREATE YOUR OWN THREE-DIMENSIONAL SHAPE.

Computer Lesson #30_____

Topic: GRAPHING

Suggested Grade Level: 6

Mathematical Essential Element: 7

Descriptor: 7.9

Objective: TLW plot on a whole coordinate plane points that represent ordered pairs of whole numbers, simple fractions, or decimal numbers arising from application problems.

Content Description: STUDENTS WILL PLOT POINTS ON GRAPH PAPER. VERBAL DIRECTIONS WILL BE GIVEN.

Prerequisite Student Skills: LISTENING SKILLS, PLOTTING

Activities:

1. USING GRAPH PAPER, STUDENTS WILL LISTEN TO THE INSTRUCTOR GIVE POINTS TO PLOT, THEN PLOT THEM.

SAMPLE PROGRAMS:

1. PLOT 4,4 TO 8,4
   PLOT 4,4 TO 4,9
   PLOT 4,9 TO 8,9
PLOT 8,4 TO 8,9
THIS MAKES A SQUARE.

2. PLOT 10,3
PLOT 9,4
PLOT 8,5
PLOT 7,6
PLOT 6,6
PLOT 7,6
PLOT 8,6
PLOT 9,6

PLOT 10,6

PLOT 11,6

PLOT 12,6

PLOT 13,6

PLOT 12,5

PLOT 11,4

PLOT 10,3

WHAT SHAPE DOES THIS CREATE?

Instructional Resource: GRAPH PAPER

Computer Lesson# _31__

Topic: GRAPHING POINTS

Suggested Grade Level: 6

Mathematical Essential Element: 7

Descriptor: 7.9

Objective:

Content Description: CONSTRUCT THE WORD "HI" USING LO-RESOLUTION GRAPHICS. Plotting on a whole coordinate plane points that represent ordered pairs of whole numbers, simple fractions, or decimal numbers arising from application problems.

Prerequisite Student Skills: KNOWLEDGE OF LO-RESOLUTION GRAPHICS, BASIC

Activities:

1. STUDENTS WILL BE INTRODUCED TO PLOTTING IN LO-RESOLUTION GRAPHICS BY PLOTTING THE POINTS FOR "HI".

PROGRAM:

```
10 GR
20 COLOR = 4
30 VLIN 4,9 AT 4
40 VLIN 4,9 AT 8
50 HLIN 4,8 AT 7
60 HLIN 12,16 AT 4
70 VLIN 4,9 AT 14
80 HLIN 12,16 AT 93
RUN
```

Instructional Resource: APPLE IIE, BASIC

Computer Lesson #_32____

Topic: GRAPHING POINTS

Suggested Grade Level: 6

Mathematical Essential Element: 7

Descriptor: 7.9

Objective:

Content Description: CONSTRUCT THE WORD "HI" USING HI-RESOLUTION GRAPHICS. Plotting on a whole coordinate plane points that represent ordered pairs of whole numbers, simple fractions, or decimal numbers arising from application problems.

Prerequisite Student Skills: KNOWLEDGE OF HI-RESOLUTION GRAPHICS, BASIC

Activities:

1. USING HI-RESOLUTION GRAPHICS THE STUDENT WILL PLOT POINTS ON THE COMPUTER TO CONSTRUCT THE WORD "HI"

PROGRAM:

```
10 HGR
20 HCOLOR=3
30 HPLOT 20,20 TO 20,60
40 HPLOT 20,40 TO 35,40
50 HPLOT 35,20 TO 35,60
60 HPLOT 45,20 TO 75,20
70 HPLOT 60,20 TO 60,60
80 HPLOT 45,60 TO 75,60
RUN
```


Instructional Resource: APPLE II E, BASIC

Computer Lesson #33_____

Topic: Parallelograms/Rotation/Flower blooming

Suggested Grade Level: 6

Mathematical Essential Element: 6

Descriptor: 6.2

Objective:

Content Description: Visualizing and sketching the results of a rotation, translation, or reflection using computer graphics where appropriate.

Prerequisite Student Skills: Parallelogram, rotation, germination.

Activities:

Type the following program:

```
CS
HOME
DRAW
TO PETAL
REPEAT 2[FD 30 RT 40 FD 15 RT 140]
CONTROL-C
TYPE PETAL (WHAT SHAPE IS THIS?) A PARALLELOGRAM.
(CAN THIS SHAPE MAKE A FLOWER?) YES. (HOW?) BY ROTATION.
TO FLOWER
REPEAT 18[PETAL RT 20]
CONTROL-C
TYPE FLOWER (HOW MANY ROTATIONS DID THE PARALLELOGRAM
MAKE?) 18
HOME
REPEAT 7[FLOWER RT 17]
```

(WHAT IS HAPPENING TO THE FLOWER?) IT BLOOMS AND DIES.
REPEAT 30[FLOWER FD 12 RT 17] (WHAT HAPPENED TO THE FLOWER?)
THE FLOWER BLOOMED AGAIN. (WHAT IS THIS SCIENTIFIC PROCESS CALLED?) GERMINATION.

Instructional Resource: Terrapin LOGO, Apple IIe

Computer Lesson #_34____

Topic: Tessellations

Suggested Grade Level: 6

Mathematical Essential Element: 6

Descriptor: 6.2

Objective: TLW use LOGO to make tessellations.

Content Description: VISUALIZING AND SKETCHING THE RESULTS OF A ROTATION, TRANSLATION, OR REFLECTION USING COMPUTER GRAPHICS WHERE APPROPRIATE.

Prerequisite Student Skills: Polygons, rotation (slide), LOGO 280*240 screen size

Activities:

1. Have students cut out a 2 inch square from paper. (approximate)
2.. Cut a design from one side
3. Slide cut off piece over to the other side . Tape down.
4. Use pattern to fill a sheet of paper.
5. Create a unique design.

COMPUTER ACTIVITY :

USING LOGO, TESSELLATE USING A RECTANGLE OR PARALLELOGRAM .

TYPE IN THE FOLLOWING PROGRAM USING CONTROL-C TO DEFINE.

A. **TO RECTANGLE**

REPEAT 2[FD 50 RT 90 FD 90 RT 90] END

TO RECTANGLEBAR

REPEAT 4[REPEAT 2[FD 50 RT 90 FD 90 RT 90] PU RT 90 FD 70 LT 90 PD]

TO RECTANGLEROW

REPEAT 6[REPEAT 4[REPEAT2[FD 50 RT 90 FD 90 RT 90]PU RT 90 FD

70 LT 90 PD] PU FD 50 PD]

B. TO PARALLELOGRAM

RT 45 FD 40 RT 45 FD 70 RT 135 FD 40 RT 45 FD 70

TO PARALLELOGRAMBAR

REPEAT 4[RT 45 FD 40 RT 45 FD 70 RT 135 FD 40 RT 45 FD 70 PU RT 180 FD 70 LT 90 PD]

TO PARALLELOGRAMROW

REPEAT 6[REPEAT 4[RT 45 FD 41 RT 45 FD 70 RT 135 FD 40 RT 45 FD 70 PU RT 180 FD 70 LT 90 PD] PU FD 30 PD]

EXTENSION:

HAVE STUDENTS USE LOGO TO CREATE THEIR OWN TESSELLATIONS. TRY USING AN OCTAGON, OR A HEXAGON.